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POCONO LAKE, MONROE COUNTY, PENNSYLVANIA

Pacific Northwest Environmental
Research Laboratory

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June 1975

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

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REPORT
ON
POCONO LAKE
MONROE COUNTY
PENNSYLVANIA
EPA REGION III
WORKING PAPER No. 424

WITH THE COOPERATION OF THE
PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES
AND THE
PENNSYLVANIA NATIONAL GUARD

JUNE, 1975

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F O R E W O R D

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Pennsylvania Department of Environmental Resources for professional involvement and to the Pennsylvania National Guard for conducting the tributary sampling phase of the Survey.

Walter A. Lyon, Director of the Bureau of Water Quality Management, Richard M. Boardman, Chief of the Division of Water Quality, and James T. Ulanoski, Aquatic Biologist of the Division of Water Quality, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

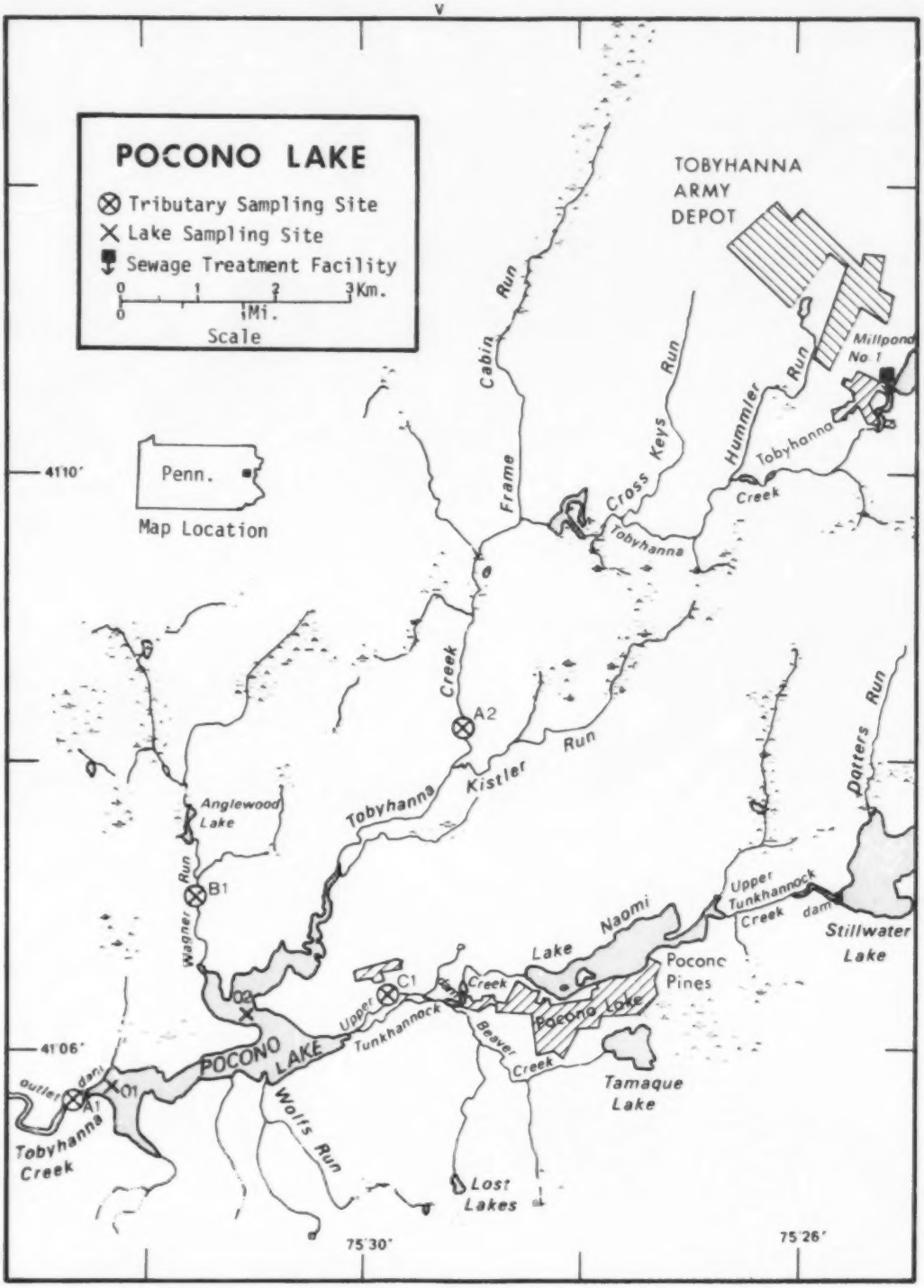
Major General Harry J. Mier, Jr., the Adjutant General of Pennsylvania, and Project Officer Major Ronald E. Wickard, who directed the volunteer efforts of the Pennsylvania National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF PENNSYLVANIA

LAKE NAME	COUNTY
Allegheny Reservoir	McKean, Warren, PA; Cattarugus, NY
Beaver Run Reservoir	Westmoreland
Beltzville	Carbon
Blanchard Reservoir	Centre
Canadohta	Crawford
Conneaut	Crawford
Conewago (Pinchot)	York
Greenlane	Montgomery
Harveys	Luzerne
Indian	Somerset
Naomi	Monroe
Ontelaunee	Berks
Pocono	Monroe
Pymatuning Reservoir	Crawford, PA; Ashtabula, OH
Shenango River Reservoir	Mercer
Stillwater	Monroe
Wallenpaupack	Pike, Wayne


POCONO LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
0 1 2 3 Km.
0 1 Mi.
Scale
Penn.
Map Location
TOBYHANNA ARMY DEPOT
Millpond No. 1
Cabin Run
Frame
Cross Keys Run
Hummler Run
Tobyhanna Creek
Creek
A2
Kistler Run
Tobyhanna
Anglewood Lake
Wagner Run
B1
Dotters Run
Upper Tunkhannock Creek dam
Stillwater Lake
Naomi Lake
Pocono Pines
C1
Pocono Lake
Beaver Creek
Tamaque Lake
POCONO LAKE
Upper Tunkhannock
outlet dam
A1
C1
Tobyhanna Creek
Wolfs Run
Lost Lakes
41°10'
41°06'
75°30'
75°26'

POCONO LAKE*

STORET NO. 4227

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Pocono Lake is mesotrophic. It ranked fifth in overall trophic quality when the 17 Pennsylvania lakes sampled in 1973 were compared using a combination of six parameters**. Ten of the lakes had less median total phosphorus, nine had less and one had the same median dissolved phosphorus, none had less but one had the same median inorganic nitrogen, one had less mean chlorophyll a, and eight had greater mean Secchi disc transparency. Marked depression of dissolved oxygen with depth occurred at station 1 in July, 1973.

Survey limnologists noted higher aquatic plants along part of the shoreline near station 2 in July.

B. Rate-Limiting Nutrient:

There was a loss of phosphorus and an apparent gain in nitrogen in the assay sample between the time of collection and the beginning of the assay and the results are not indicative of conditions in the lake at the time the sample was taken.

The lake data indicate nitrogen limitation in April but phosphorus limitation in July and October.

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* Table of metric conversions--Appendix A.
** See Appendix B.

C. Nutrient Controllability:

1. Point sources--The phosphorus contribution from known point sources, including septic tanks, amounted to 37.9% of the total phosphorus load to Pocono Lake during the sampling year. The major portion of this load (37.4%) came from the wastewater treatment plant at the Tobyhanna Army Depot.

Although the present loading rate of 0.93 $g/m^2/yr$ is below the rate proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic rate (see page 12), phosphorus inputs from all sources should be minimized to improve or maintain the existing quality of Pocono Lake.

2. Non-point sources--The mean annual contribution from non-point sources accounted for 62.1% of the total phosphorus load to Pocono Lake. Tobyhanna Creek contributed 15.4%, Upper Tunkhannock Creek contributed 22.4%, and Wagner Run contributed 6.7% of the total. Ungaged tributaries were estimated to have contributed 15.6% of the load.

The phosphorus exports of the Pocono Lake tributaries were quite low (see page 12) and compare well with the two tributaries of nearby Stillwater Lake* (8 and 12 $kg/km^2/yr$).

* Working Paper No. 427.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry†:

1. Surface area: 3.04 kilometers^2.
2. Mean depth: 3.7 meters.
3. Maximum depth: 7.9 meters.
4. Volume: 11.248 x 10^6 m^3.
5. Mean hydraulic retention time: 37 days (based on outlet flow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Tobyhanna Creek	79.8	2.4
Wagner Run	14.0	0.3
Upper Tunkhannock Creek	65.3	1.4
Minor tributaries & immediate drainage -	31.6	0.8
Totals	190.7	4.9

2. Outlet -

Tobyhanna Creek	193.7**	3.5

C. Precipitation***:

1. Year of sampling: 149.0 centimeters.
2. Mean annual: 120.3 centimeters.

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† Ulanoski, 1975.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Pocono Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from two stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 4.0 meters at station 1 and 2.1 meters at station 2 (station 2 was not sampled in the fall due to lack of depth).

The lake sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR POCONO LAKE
STORET CODE 4227

PARAMETER	1ST SAMPLING (4/17/73) 2 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (7/23/73) 2 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (10/ 3/73) 1 SITES RANGE	MEAN	MEDIAN
TEMP (C)	9.0 - 10.3	9.6	9.2	19.6 - 22.9	21.3	22.8	15.0 - 15.9	15.4	15.4
DISS OXY (MG/L)	11.2 - 11.3	11.2	11.2	1.8 - 7.0	5.1	6.9	7.8 - 8.4	8.1	8.1
CNDCTVY (MCHOMO)	50. - 50.	50.	50.	24. - 32.	31.	30.	27. - 27.	27.	27.
PH (STAND UNITS)	6.7 - 7.3	7.1	7.2	5.4 - 5.9	5.7	5.7	5.7 - 6.0	5.8	5.8
TOT ALK (MG/L)	10. - 10.	10.	10.	10. - 10.	10.	10.	10. - 10.	10.	10.
TOT P (MG/L)	0.013 - 0.016	0.015	0.015	0.022 - 0.031	0.028	0.030	0.038 - 0.042	0.040	0.040
ORTHO P (MG/L)	0.005 - 0.015	0.008	0.007	0.005 - 0.009	0.007	0.007	0.006 - 0.007	0.006	0.006
NO2+NO3 (MG/L)	0.043 - 0.070	0.056	0.060	0.050 - 0.170	0.092	0.080	0.080 - 0.100	0.090	0.090
AMMONIA (MG/L)	0.030 - 0.050	0.036	0.030	0.070 - 0.150	0.096	0.090	0.100 - 0.120	0.110	0.110
KJEL N (MG/L)	0.200 - 0.500	0.300	0.400	0.300 - 0.500	0.420	0.400	0.800 - 1.200	1.000	1.000
INORG N (MG/L)	0.070 - 0.120	0.092	0.090	0.130 - 0.270	0.188	0.140	0.180 - 0.220	0.200	0.200
TOTAL N (MG/L)	0.280 - 0.570	0.413	0.440	0.460 - 0.560	0.512	0.520	0.880 - 1.300	1.090	1.090
CHLRPYL A (UG/L)	2.8 - 3.1	2.9	2.9	4.3 - 9.5	6.9	6.9	5.2 - 5.2	5.2	5.2
SECCHI (METERS)	1.7 - 2.4	2.1	2.1	1.4 - 1.5	1.4	1.4	0.8 - 0.8	0.8	0.8

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal units per ml
04/17/73	1. Dynobryon	247
	2. Flagellates	226
	3. Tabellaria	54
	4. Asterionella	21
	5. Melosira	11
	Other genera	55
	Total	614
07/23/73	1. Melosira	519
	2. Cryptomonas	294
	3. Asterionella	286
	4. Synedra	263
	5. Flagellates	225
	Total	1,587
10/03/73	1. Melosira	649
	2. Flagellates	325
	3. Cyclotella	72
	4. Scenedesmus	54
	5. Nitzschia	36
	Other genera	127
	Total	1,263

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
04/17/73	01	3.1
	02	2.8
07/23/73	01	9.5
	02	4.3
10/03/73	01	5.2
	02	-

C. Limiting Nutrient Study:

There was a loss of phosphorus and an apparent gain in nitrogen in the assay sample between the time of collection and the beginning of the assay. As a result, the limiting nutrient was shifted from nitrogen in the lake (N/P ratio = 12/1) to phosphorus limitation in the sample (N/P = >23/1), and the assay results are not representative of conditions in the lake at the time the sample was collected.

The lake data indicate nitrogen limitation in April (N/P = 12/1) but phosphorus limitation in July (N/P = 27/1) and October (N/P = 33/1).

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Pennsylvania National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of February and March when two samples were collected. Sampling was begun in May, 1973, and was completed in April, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Pennsylvania District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient exports, in $kg/km^2/year$, at station B-1 and multiplying the means by the ZZ area in km^2.

The operator of the Tobyhanna Army Depot wastewater treatment plant provided monthly effluent samples and corresponding flow data.

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* See Working Paper No. 175.

A. Waste Sources:

1. Known muncipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Tobyhanna Army Depot	3,316	trickling filter	1,015.6	Tobyhanna Creek

2. Known industrial - None

* Rinaldi, 1973 (more than 25% of total waste load to plant is industrial; i.e., a plating shop).

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Tobyhanna Creek	435	15.4
Wagner Run	190	6.7
Upper Tunkhannock Creek	630	22.4
b. Minor tributaries & immediate drainage (non-point load) -	440	15.6
c. Known municipal STP's -		
Tobyhanna Army Depot	1,055	37.4
d. Septic tanks* -	15	0.5
e. Known industrial - None	-	-
f. Direct precipitation** -	55	2.0
Total	2,820	100.0

2. Outputs -

Lake outlet - Tobyhanna Creek 2,535

3. Net annual P accumulation - 285 kg.

* Estimate based on 53 lakeside dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Tobyhanna Creek	41,885	38.9
Wagner Run	6,910	6.4
Upper Tunkhannock Creek	34,375	31.9
b. Minor tributaries & immediate drainage (non-point load) -	15,610	14.5
c. Known municipal STP's -		
Tobyhanna Army Depot	5,095	4.7
d. Septic tanks* -	565	0.5
e. Known industrial - None	-	-
f. Direct precipitation** -	3,280	3.1
Total	107,720	100.0

2. Outputs -

Lake outlet - Tobyhanna Creek 78,400

3. Net annual N accumulation - 29,320 kg.

* Estimate based on 53 lakeside dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Tobyhanna Creek	5	525
Wagner Run	14	494
Upper Tunkhannock Creek	10	526

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m²/yr	0.93	0.09	35.4	9.6

Vollenweider loading rates for phosphorus (g/m²/yr) based on mean depth and mean hydraulic retention time of Pocono Lake:

"Dangerous" (eutrophic rate)	1.16
"Permissible" (oligotrophic rate)	0.58

V. LITERATURE REVIEWED

Rinaldi, William (Operator), 1973. Treatment plant questionnaire (Tobyhanna Army Depot STP). Tobyhanna.

Ulanoski, James, 1975. Personal communication (lake morphometry). PA Dept. Env. Resources, Harrisburg.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VII. APPENDICES

APPENDIX A

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	4224	LAKE NAOMI	445
2	4220	BELTZVILLE DAM	423
3	4222	HARVEY'S LAKE	413
4	4228	STILLWATER LAKE	401
5	4227	POCONO LAKE	389
6	4223	INDIAN LAKE	388
7	3641	ALLEGHENY RESERVOIR	385
8	4229	LAKE WALLENPAUPACK	371
9	4221	CANADOHTA LAKE	369
10	4219	BEAVER RUN RESERVOIR	360
11	4204	CONNEAUT LAKE	307
12	4226	PINCHOT LAKE	256
13	4213	PYMATUNING RESERVOIR	206
14	4216	SHENANGO RIVER RESERVOIR	157
15	4225	ONTELAUNEE DAM	101
16	4201	BLANCHARD RESERVOIR	85
17	4207	GREENLANE DAM	53

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS P	INDEX NO
3641	ALLEGHENY RESERVOIR	56 (9)	38 (6)	63 (10)	100 (16)	69 (11)	59 (8)	385
4201	BLANCHARD RESERVOIR	13 (2)	13 (2)	25 (4)	31 (5)	3 (0)	0 (0)	85
4204	CONNEAUT LAKE	44 (7)	63 (10)	69 (11)	56 (9)	34 (5)	41 (6)	307
4207	GREENLANE DAM	6 (1)	6 (1)	19 (3)	13 (2)	3 (0)	6 (1)	53
4213	PYMATUNING RESERVOIR	0 (0)	72 (11)	6 (1)	0 (0)	100 (16)	28 (4)	206
4216	SHENANGO RIVER RESERVOIR	19 (3)	44 (7)	13 (2)	6 (1)	47 (7)	28 (4)	157
4219	BEAVER RUN RESERVOIR	94 (15)	19 (3)	88 (14)	81 (13)	19 (2)	59 (8)	360
4220	BELTZVILLE DAM	88 (14)	25 (4)	94 (15)	94 (15)	34 (5)	88 (13)	423
4221	CANADOHTA LAKE	50 (8)	97 (15)	56 (9)	19 (3)	59 (9)	88 (13)	369
4222	HARVEY'S LAKE	63 (10)	81 (13)	100 (16)	63 (10)	47 (7)	59 (8)	413
4223	INDIAN LAKE	100 (16)	31 (5)	75 (12)	75 (12)	19 (2)	88 (13)	388
4224	LAKE NAOMI	81 (13)	88 (14)	44 (7)	69 (11)	88 (14)	75 (12)	445
4225	ONTELAUNEE DAM	25 (4)	0 (0)	0 (0)	44 (7)	19 (2)	13 (2)	101
4226	PINCHOT LAKE	31 (5)	56 (9)	31 (5)	38 (6)	81 (13)	19 (3)	256
4227	POCONO LAKE	38 (6)	97 (15)	50 (8)	88 (14)	75 (12)	41 (6)	389
4228	STILLWATER LAKE	72 (11)	72 (11)	38 (6)	25 (4)	94 (15)	100 (16)	401
4229	LAKE WALLENPAUPACK	72 (11)	50 (8)	81 (13)	50 (8)	59 (9)	59 (8)	371

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS P
3641	ALLEGHENY RESERVOIR	0.016	0.380	414.250	3.700	13.800	0.006
4201	BLANCHARD RESERVOIR	0.064	1.300	453.143	15.187	14.900	0.046
4204	CONNEAUT LAKE	0.023	0.185	402.000	7.567	14.600	0.007
4207	GREENLANE DAM	0.066	1.475	460.222	24.011	14.900	0.020
4213	PYMATUNING RESERVOIR	0.070	0.180	467.750	56.333	7.700	0.008
4216	SHENANGO RIVER RESERVOIR	0.058	0.340	463.555	26.800	14.500	0.008
4219	BEAVER RUN RESERVOIR	0.009	0.835	384.833	5.183	14.800	0.006
4220	BELTZVILLE DAM	0.010	0.815	362.444	4.856	14.600	0.005
4221	CANADOHTA LAKE	0.020	0.130	436.000	19.167	14.100	0.005
4222	HARVEY'S LAKE	0.015	0.160	338.000	5.967	14.500	0.006
4223	INDIAN LAKE	0.008	0.520	400.222	5.211	14.800	0.005
4224	LAKE NAOMI	0.014	0.135	443.333	5.533	8.000	0.005
4225	ONTELAUNEE DAM	0.040	2.150	470.667	11.783	14.800	0.011
4226	PINCHOT LAKE	0.027	0.245	453.000	13.950	11.500	0.008
4227	POCONO LAKE	0.024	0.130	438.800	4.980	13.200	0.007
4228	STILLWATER LAKE	0.015	0.180	449.000	18.233	7.900	0.004
4229	LAKE WALLENPAUPACK	0.015	0.250	394.583	9.617	14.100	0.006

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR PENNSYLVANIA 1/27/75

LAKE CODE 4227 POCONO LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 193.7

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
4227A1	193.7	3.09	3.06	6.74	6.74	4.19	2.72	2.07	2.01	1.64	2.15	4.02	3.48	3.53
4227A2	79.8	2.41	2.27	4.68	4.81	3.40	1.70	1.44	1.44	0.88	1.30	2.27	2.63	2.39
4227B1	14.0	0.28	0.27	0.48	0.59	0.42	0.20	0.17	0.17	0.10	0.15	0.27	0.31	0.28
4227C1	65.3	1.42	1.36	2.01	2.24	1.78	1.10	0.99	1.02	0.68	0.91	1.36	1.50	1.36
4227Z2	34.7	0.68	0.68	1.13	1.42	1.05	0.45	0.57	0.54	0.37	0.51	0.88	0.76	0.75

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 193.7
SUM OF SUB-DRAINAGE AREAS = 193.8
TOTAL FLOW IN = 57.44
TOTAL FLOW OUT = 42.45

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4227A1	5	73	7.08	19	9.91				
	6	73	7.65	23	9.34				
	7	73	5.10	14	7.39				
	8	73	4.25	4	10.34				
	9	73	3.93	8	1.98				
	10	73	2.46	13	1.73				
	11	73	4.53	10	4.96				
	12	73	12.74	8	2.58				
	1	74	6.80	12	5.95				
	2	74	5.66	9	3.82				
	3	74	6.23	16	5.38				
	4	74	7.36	13	7.08				
4227A2	5	73	4.41	19	6.80				
	6	73	6.23	23	1.98				
	7	73	2.83	14	2.32				
	8	73	1.65	8	0.62				
	10	73	1.15	13	6.74				
	11	73	1.56	10	2.61				
	12	73	7.65	8	6.37				
	1	74	2.94	12	2.63				
	2	74	2.75	9	1.50				
	3	74	4.96	16	4.25				
	4	74	5.95	13	5.50				

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TRIBUTARY FLOW INFORMATION FOR PENNSYLVANIA 1/27/75

LAKE CODE 4227 POCONO LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4227B1	5	73	0.59	19	0.88				
	6	73	0.76	23	0.23				
	7	73	0.34	14	0.28				
	8	73	0.20	4	0.51				
	9	73	0.12	8	0.07				
	10	73	0.14	13	0.08				
	11	73	0.18	10	0.14				
	12	73	0.96	8	0.79				
	1	74	0.48	12	0.31				
	2	74	0.31	9	0.18				
	3	74	0.59	16	0.51				
	4	74	0.71	13	0.68				
4227C1	5	73	2.29	19	2.63				
	6	73	2.69	23	1.22				
	7	73	1.56	14	1.39				
	8	73	1.10	4	2.04				
	9	73	0.79	8	0.57				
	10	73	0.85	13	0.62				
	11	73	1.05	10	0.91				
	12	73	3.11	8	2.72				
	1	74	1.98	12	1.47				
	2	74	1.53	9	1.02				
	3	74	2.29	16	2.07				
	4	74	2.58	13	2.55				
4227Z1	5	73	1.27	19	1.78				
	6	73	1.36	23	0.62				
	7	73	0.91	14	0.79				
	8	73	0.76	4	1.84				
	9	73	0.71	8	0.34				
	10	73	0.45	13	0.31				
	11	73	0.82	10	0.88				
	12	73	2.29	8	0.45				
	1	74	1.22	12	1.08				
	2	74	1.02	9	0.68				
	3	74	1.10	16	0.96				
	4	74	1.33	13	1.27				

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/01/27

422701
41 05 50.0 075 32 16.0
POCONO LAKE
42089 PENNSYLVANIA

11EPALES
3

2111202
0017 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENTI	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/17	09	35 0000	9.2		66	50K	7.20	10K	0.050	0.500	0.070	0.015
	09	35 0005	9.2	11.2		50K	7.00	10K	0.030	0.200	0.060	0.005
	09	35 0009	9.0	11.2		50K	6.70	10K	0.030	0.400	0.070	0.007
73/07/23	09	50 0000	22.4		54	30	5.70	10K	0.090	0.500	0.050	0.007
	09	50 0005	22.8	7.0		30	5.70	10K	0.070	0.400	0.060	0.008
	09	50 0013	19.0	1.8		29	5.40	10K	0.150	0.400	0.120	0.007
73/10/03	15	45 0000	15.9	8.4	30	27	6.00	10K	0.120	1.200	0.100	0.007
	15	45 0005	15.6	7.8		27	5.70	10K	0.100	0.800	0.080	0.006

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/17	09	35 0000	0.010	3.1
	09	35 0005	0.015	
	09	35 0009	0.010	
73/07/23	09	50 0000	0.030	9.5
	09	50 0005	0.022	
	09	50 0013	0.030	
73/10/03	15	45 0000	0.034	5.2
	15	45 0005	0.042	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/27

422702
41 06 20.0 075 31 03.0
POCONO LAKE
42089 PENNSYLVANIA

11EPALES
3

2111202
0010 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/17	10 10 0000		10.3		96	50K	7.30	10K	0.040	0.400	0.040	0.007
	10 10 0005		10.2	11.3		50K	7.30	10K	0.030	0.300	0.040	0.008
73/07/23	10 15 0000		22.4		66	32	5.90	10K	0.070	0.500	0.060	0.005
	10 15 0007		19.0	6.4		32	5.60	10K	0.100	0.300	0.170	0.009

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/17	10 10 0000		0.015	2.8
	10 10 0005		0.013	
73/07/23	10 15 0000		0.027	4.3
	10 15 0007		0.031	

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/02/03

422/A1
41 05 45.0 075 32 30.0
TOBYHANNA CREEK
42133 7.5 BLAKESLEE
U/POCONO LAKE
DAM SPILLWAY OR JUST DOWNSTREAM FROM IT
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N02&N03 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/14	17 05		0.042	0.540	0.064	0.011	0.030
73/06/23	10 34		0.035	0.640	0.046	0.006	0.025
73/07/14	10 55		0.013	0.500	0.176	0.011	0.025
73/08/05	11 45		0.046	0.440	0.050	0.017	0.035
73/09/09	11 10		0.030	1.800	0.260	0.005K	0.025
73/10/07	12 15		0.045	0.400	0.050	0.006	0.035
73/11/11	14 30		0.056	0.900	0.036	0.016	0.025
73/12/09	14 10		0.084	1.200	0.032	0.008	0.020
74/01/06	14 25		0.108	0.100	0.016	0.005K	0.010
74/02/09	15 50		0.140	0.300	0.030	0.005K	0.005
74/02/23	15 50		0.140	0.800	0.040	0.015	0.020
74/03/16	10 55		0.104	0.400	0.023	0.005K	0.015
74/03/30	14 30		0.084	0.400	0.010	0.010	0.010
74/04/13	11 00		0.076	0.600	0.025	0.005K	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/03

422742
41 08 16.0 075 28 58.0
TOBYHANNA CREEK
42 7.5 TOBYHANNA
1/POCONO LAKE
BANK OFF HWY 423 2.7 MI N TWN POCONO LK
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/19	16 00		0.023	0.310	0.015	0.008	0.020
73/06/23	10 30		0.200	0.700	0.046	0.018	0.040
73/07/14	10 12		0.115	0.960	0.190	0.023	0.030
73/08/05	11 00		0.066	0.340	0.025	0.010	0.030
73/09/04	10 25		0.110	0.460	0.044	0.013	0.030
73/10/07	11 30		0.015	0.300	0.028	0.020	0.020
73/11/11	13 30		0.152	1.100	0.044		0.015
73/12/09	13 05		0.084	0.900	0.040	0.008	0.015
74/01/06	11 10		0.156	0.100K	0.024	0.005	0.010
74/02/04	15 05		0.152	0.600	0.040	0.005K	0.010
74/02/23	15 05		0.192	0.200	0.025	0.015	0.020
74/03/16	10 35		0.088	0.500	0.035	0.005	0.015
74/03/30	14 50		0.104	0.400	0.045	0.005	0.010
74/04/13	10 30		0.060	0.200	0.015	0.005	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

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STORET RETRIEVAL DATE 75/02/03

422701
41 07 10.0 075 31 30.0
WAGNER RUN
42 7.5 BLAKESLEE
1/POCONO LAKE
HWY 940 BRDG AT WAGNERS
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/19	16 40		0.014	0.300	0.009	0.007	0.010
73/06/23	10 10		0.078	0.620	0.044	0.016	0.040
73/07/14	10 35		0.058	2.100	0.230	0.020	0.035
73/08/05	11 25		0.035	0.360	0.040	0.022	0.045
73/09/09	10 40		0.072	0.480	0.046	0.016	0.035
73/10/07	11 55		0.035	0.950	0.056	0.013	0.020
73/11/11	10 15		0.040	1.300	0.040	0.010	0.015
73/12/09	13 40		0.036	0.300	0.020	0.008	0.010
74/01/06	11 30		0.060	0.100	0.036	0.005	0.010
74/02/04	15 35		0.084	2.500	0.130	0.005K	0.005
74/02/23	15 35		0.092	0.200	0.025	0.020	0.020
74/03/16	10 40		0.056	0.200	0.020	0.005	0.010
74/03/30	13 45		0.040	0.500	0.020	0.005	0.010
74/04/13	10 45		0.004	0.100	0.005K	0.005	0.005

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/03

422701
41 06 22.0 075 29 40.0
UPPER TURKHANNOCK LAKE
42 7.5 POCONO PINES
T/POCONO LAKE
HWY 940 BRDG 1.8 MI E OF WAGNERS
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/14	16	20	0.054	0.360	0.013	0.006	0.020
73/06/23	11	00	0.074	0.350	0.028	0.007	0.020
73/07/14	11	14	0.046	1.300	0.210	0.011	0.015
73/08/05	12	10	0.029	0.840	0.036	0.005K	0.020
73/09/09	11	25	0.075	1.400	0.088	0.005K	0.020
73/10/07	11	50	0.046	0.250	0.028	0.006	0.010
73/11/11	14	05	0.040	0.900	0.036	0.012	0.012
73/12/09	13	13	0.054	0.400	0.020	0.005K	0.015
74/01/05	11	23	0.140	0.200	0.024	0.005K	0.010
74/02/04	15	25	0.148	1.000	0.065	0.005K	0.005
74/02/23	15	25	0.140	0.150	0.015	0.015	0.015
74/03/16	11	10	0.124	1.200	0.040	0.005K	0.015
74/03/30	13	00	0.108	1.100	0.045	0.005K	0.010
74/04/13	11	15	0.084	0.200	0.010	0.005K	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/03

4227AA TF4227AA PA03316
41 10 40.0 075 24 58.0
TOBYHANNA ARMY DEPOT
42133 7.5 TOBYHANNA
T/POCONO LAKE
TOBYHANNA CREEK
11PALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/07/30			3.900	9.650	5.000	1.980	2.700	0.298	0.259
73/08/21				9.900		3.500	4.700	0.273	0.270
73/09/24			4.700	7.300	3.200	1.760	2.400	0.300	0.275
73/10/30	07 30								
CP(T)-			4.600	4.500	2.500	1.300	1.965	0.275	0.280
73/10/30	15 00								
73/11/28	08 00								
CP(T)-			2.940	12.000	5.300	1.600	2.400	0.275	0.269
73/11/28	15 00								
74/02/19	08 00								
CP(T)-			2.400	11.000	3.400	1.440	2.000	0.295	0.275
74/02/19	15 00								
74/03/14	10 00								
CP(T)-			4.000	9.700			2.700	0.300	0.268
74/03/14	15 00								
74/04/22	08 00								
CP(T)-			2.500	16.000	4.600	3.600	4.600	0.280	0.259
74/04/22	15 00								
74/05/14	09 00								
CP(T)-			4.400	11.000	5.000	1.700	2.600	0.289	0.268
74/05/14	15 00								
74/06/14	08 00								
CP(T)-			3.680	9.450	5.600	2.100	2.550	0.280	0.260
74/06/14	15 00								